

## In a Fog? Cloud Formation

Clouds are important features for determining weather. Cloud formation requires that the air be saturated (100% humidity) and the presence of condensation nuclei, which are 0.2- $\mu$ m particles such as dust, pollen, sea salt, or smoke. As warm air rises and cools, water vapor condenses around condensation nuclei and a cloud begins to form.

### Materials Required

#### Temperature

Beaker, 1 L (731013), or Large Jar  
Resealable Plastic Bag  
Hot Water (approximately 40° C)  
Match (706637)  
Ice

#### Pressure

Soft-Sided Plastic Water Bottle,  
1 L, with Cap  
Tap Water  
Match (706637)

### Safety

Ensure that students understand and adhere to safe laboratory practices when performing any activity in the classroom or lab. Be aware that the beaker may be warm or hot to the touch. Use proper precaution to avoid burns.

### Activity Procedure

#### Temperature

1. Fill the resealable plastic bag with ice, seal, and set aside.
2. Fill the large beaker or jar  $\frac{1}{4}$  to  $\frac{1}{3}$  full with hot water.
3. Strike a match and drop it into the water.
4. Quickly place the bag of ice on top of the beaker.
5. Observe for 3 to 5 minutes.
6. Lift the bag of ice off the beaker and observe immediately.

#### Pressure

1. Put just enough water in the empty 1-L water bottle to cover the bottom of the bottle.
2. Cap the bottle and shake it vigorously.
3. Uncap the bottle. Light a match and immediately put it in the water bottle. Cap the bottle.
4. Squeeze and release the bottle repeatedly. Make observations.

### Results/Summary

Both techniques result in cloud formation but for different reasons. Forming a cloud using ice over water emphasizes the role that temperature plays, while the sealed bottle emphasizes the role pressure plays in cloud formation. Cooling water vapor results in condensation. Increasing pressure on the sealed bottle forces more water molecules into the liquid state, while decreasing pressure results in more water molecules in the vapor state. In both cases, smoke from the match serves as the condensation nuclei around which water vapor can condense.

### Additional Information

View more information, content links, and products related to this activity at [www.carolina.com/takeaways](http://www.carolina.com/takeaways).

